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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/007,169	11/30/2001	Jeong Ik Lee	2013p003	4288

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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

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DATE MAILED: 06/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/007,169

Applicant(s)

LEE ET AL.

Examiner

Marie R. Yamnitzky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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1. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The scope of alkyl groups and aryl groups substituted by alkyl groups containing one or more atoms selected from the group consisting of O, N, S, Si and Ge is not clear. Based on dependent claim 9 and the specification, it is apparent that at least in the case of O atoms, the O atoms may interrupt the alkyl chain and/or may be present between the alkyl chain and the aromatic ring to which the R group is attached, but the entire scope of groups suitable for R₁ and R₂ is not clear. For example, in the case of aryl groups substituted by alkyl groups, it is not clear if one or more carbons of the aryl group can be substituted by an atom selected from the group, such that the aryl group may actually be a heteroaryl group. The limited number of examples of specific R₁ and R₂ groups in the specification provides insufficient guidance to determine the scope of the groups as claimed.

The scope of R₁ and/or R₂ as defined by claims 3 and 6 is not clear. For example, would a straight-chain alkyl group having two oxygen atoms according to these claims have the structure -CH₂-O-CH₂-O-CH₃ or the structure -O-CH₂-O-CH₃ or the structure -CH₂-CH₂-O-CH₂-CH₂-O-CH₂-CH₃ or some other structure?

2. Regarding claim interpretation, "n" is not explicitly defined for the formula set forth in independent claim 4, with claims 5-10 dependent therefrom. Since the preamble recites "polymer comprising repeating units of the" formula, the examiner interprets claims 4-10 as

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requiring more than one unit of the formula, but as allowing “n” to be 1 such that the polymer may comprise two units of the formula joined to each other via a unit not of the formula.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Kreuder et al. (5,621,131).

Claim 10 is included in this rejection as dependent from claim 4.

See the whole patent. In particular, see column 2, line 1-c. 4, l. 51, c. 6, l. 41-c. 8, l. 16, c. 9, l. 7-18 and c. 9, l. 63-c. 10, l. 46.

Kreuder et al. disclose polymers of spirobisfluorene for use as a light emitting material in an electroluminescence element having the structure of a layer comprising the polymer interposed between an anode and a cathode. Among Kreuder's particularly preferred polymers, a polymer in which each of C and D represents the t-Bu substituted group shown at c. 7, l. 35-40 meets the limitations of a polymer as defined in present claim 4, subject to interpretation of the definition of R₁ and R₂ in the present claims. (Absent clarification of the scope of present R₁ and R₂, the examiner considers the t-Bu substituted group shown at c. 7, l. 35-40 of the Kreuder

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patent to meet the limitations of an aryl group substituted by C₁₋₂₂ alkyl and containing one or more atoms selected from the group consisting of O, N, S, Si and Ge.)

Based on Kreuder's description of the preparation of the polymers using aromatic diboronic acids or aromatic dihalides, one of ordinary skill in the art at the time of the invention would have at once envisaged the compound defined by the formula set forth in present claim 1 as a monomer suitable for providing Kreuder's particularly preferred polymers in which each of C and D represents the t-Bu substituted group shown at c. 7, l. 35-40.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 7, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kreuder et al. (5,621,131) as applied to claims 1, 4 and 10 above, and for the further reasons set forth below.

Claim 10 is included in this rejection as dependent from claim 7 or claim 8.

Kreuder's particularly preferred polymer in which each of C and D represents the t-Bu substituted group shown at c. 7, l. 35-40 is a polymer of present claim 4 in which R₁ and R₂ are at positions 2' and 7'. This polymer is a position isomer of the polymer required by present claim 7 and the polymer required by present claim 8.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make spirobisfluorene polymers similar to the spirobisfluorene polymers of the prior art in order to provide other polymers that could be used as a light emitting material in an electroluminescent element. Position isomers are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties. *In re Wilder*, 563 F. 2d 457, 195 USPQ 426 (CCPA 1977). One of ordinary skill in the art would have reasonably expected that providing structurally similar polymers having the C and D substituents at different positions on the spirobisfluorene structure would provide other polymers having light emitting properties that would be suitable for use in an electroluminescent element.

7. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rietz et al. (6,132,641).

See the whole patent. In particular, see column 1, line 5-c. 2, l. 8, c. 2, l. 16-29, c. 4, l. 42-c. 5, l. 18, c. 6, l. 47-c. 7, l. 7, c. 7, l. 58-c. 8, l. 2 and c. 9, l. 25-65.

Rietz et al. disclose fluorescent polymers of spirobisfluorene for use as a light emitting material in an electroluminescence element having the structure of a layer comprising the polymer interposed between a pair of electrodes.

The spirobisfluorene repeating units may be substituted with two R groups. Suitable R groups include C₁-C₁₈alkoxy, R₂-(O-C_nH_{2n})_m-O- where R₂ is H or C₁-C₁₂alkyl, n is from 2 to 6 and m is from 1 to 12, C₁-C₁₈alkylthio, C₁-C₁₈dialkylamino, -C(O)O-C₁-C₁₈alkyl, -C(O)-N(C₁-C₁₈alkyl)₂, -SO₃-C₁-C₁₈alkyl, -SO₂-N(C₁-C₁₈alkyl)₂, C₁-C₁₇alkyl-C(O)-O- and C₁-C₁₇alkyl-

C(O)-. Subject to interpretation of the definition of R_1 and R_2 in the present claims, any of these substituents meets the limitations of a straight-chain or branched alkyl group having from 1 to 22 carbon atoms and containing one or more atoms selected from the group consisting of O, N, S, Si and Ge. Of these substituents, $R_2-(O-C_nH_{2n})_m-O-$ where R_2 is H or C_1-C_{12} alkyl, n is from 2 to 6 and m is from 1 to 12 provides polar groups containing an ether bond and encompasses 3,6-dioxaheptyloxy (which has the formula $CH_3-(O-C_2H_4)_2-O-$) and 3,6,9-trioxadecyloxy (which has the formula $CH_3-(O-C_2H_4)_3-O-$).

The polymer can be made from a spirobisfluorene compound substituted with the two R groups and also substituted with two halogens.

Rietz's spirobisfluorene compounds and polymers are position isomers of the spirobisfluorene compounds and polymers of the present claims. Numbering the carbons of the fluorene rings in the formula shown in present claim 1 such that the X's are at positions 2 and 7, R_2 is at one of positions 1' to 4' and R_1 is at one of positions 5' to 8', Rietz's compounds represented by prior art formula (IV) as shown in column 6 are compounds in which the X's are at positions 7 and 7', and the R groups are at positions 2 and 2'. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make spirobisfluorene compounds and polymers similar to the spirobisfluorene compounds and polymers of the prior art in order to provide other fluorescent polymers that could be used for the same purposes as the prior art polymers. Position isomers are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties. *In re Wilder*, 563 F. 2d 457, 195 USPQ 426 (CCPA 1977). One of ordinary skill in the art would have

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reasonably expected that joining multiple spirobisfluorene units via positions 2 and 7 rather than 7 and 7' would provide polymers having properties similar to Rietz's polymers. For example, polymers having these alternative structures have similar conjugation lengths in the main chain of the polymers and thus would reasonably be expected to have similar light emitting properties. One of ordinary skill in the art also would have reasonably expected that providing the R groups at different positions on the spirobisfluorene structure would not destroy the light emitting properties of the polymer.

8. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure.

Kreuder et al. (5,763,636) is a continuation-in-part of the Kreuder '131 patent applied above and also suggests compounds, polymers and devices within the scope of the present claims.

9. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (703) 308-4413. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax numbers for Art Unit 1774 are (703) 872-9311 for official after final faxes and (703) 872-9310 or (703) 305-5408 for all other official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (703) 872-9041.)

MRY
06/24/03



MARIE YAMNITZKY
PRIMARY EXAMINER

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